



TM-1005
9050.000
October 9, 1980

BEAM TRANSPORT

FOR A PROMPT NEUTRINO

TARGET AREA

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A proton transport system has been developed for a prompt neutrino target in the Neutrino Area. The beam uses the same elements as the N7 beam line into Enclosure 103 as described in TM 934. However, two enclosures are added near the Wonder Building and near Enclosure 109 to complete the transport system. The new enclosures and enclosure 103 are shown in figure 1A to 1C.

The three most significant constraints met by the transport system are the following: The beam must not aim at the neutrino detectors, especially in the downstream enclosures where beam scrapping can add serious backgrounds to the prompt neutrino signal. The beam size must be small at the superconducting dipoles to minimize beam heating effects due to the interaction of the beam with the dipoles. Finally, the beam should have a large spot size at the target to minimize the effects of rapid heating in the target material.

The conditions for beam size were met with appropriate quadrupole fields in Enclosure 103. The beam profiles are shown in Figure 2. The super dipoles are located in enclosure 105' and the prompt ν hall where the beam is less than one inch in size everywhere, and fits within the apertures of the dipoles in these enclosures. The beam at the target is about one inch in diameter and should be large enough to permit effective cooling of the target between beam pulses.

In Enclosure 105' the dipoles sweep the proton beam across the face

of the detectors. Scrapping in this area would create serious backgrounds for the prompt neutrino signal. To remedy this problem, the dipoles are rotated so that the beam is bent down and then up simultaneously as the beam is bent to the west. This corkscrew arrangement prevents the beam from aiming at the detector. The beam is always ten mrad or more relative to the detectors.

The final dipole arrangement in the prompt hall can vary the production angle at the target between zero and 40 mrad. However, the dipoles must be moved laterally as the target angle changes if the beam is to strike the target at the same position for each targeting angle. The mechanical system that would be required to make these lateral magnet shifts has not been designed.

TABLE I

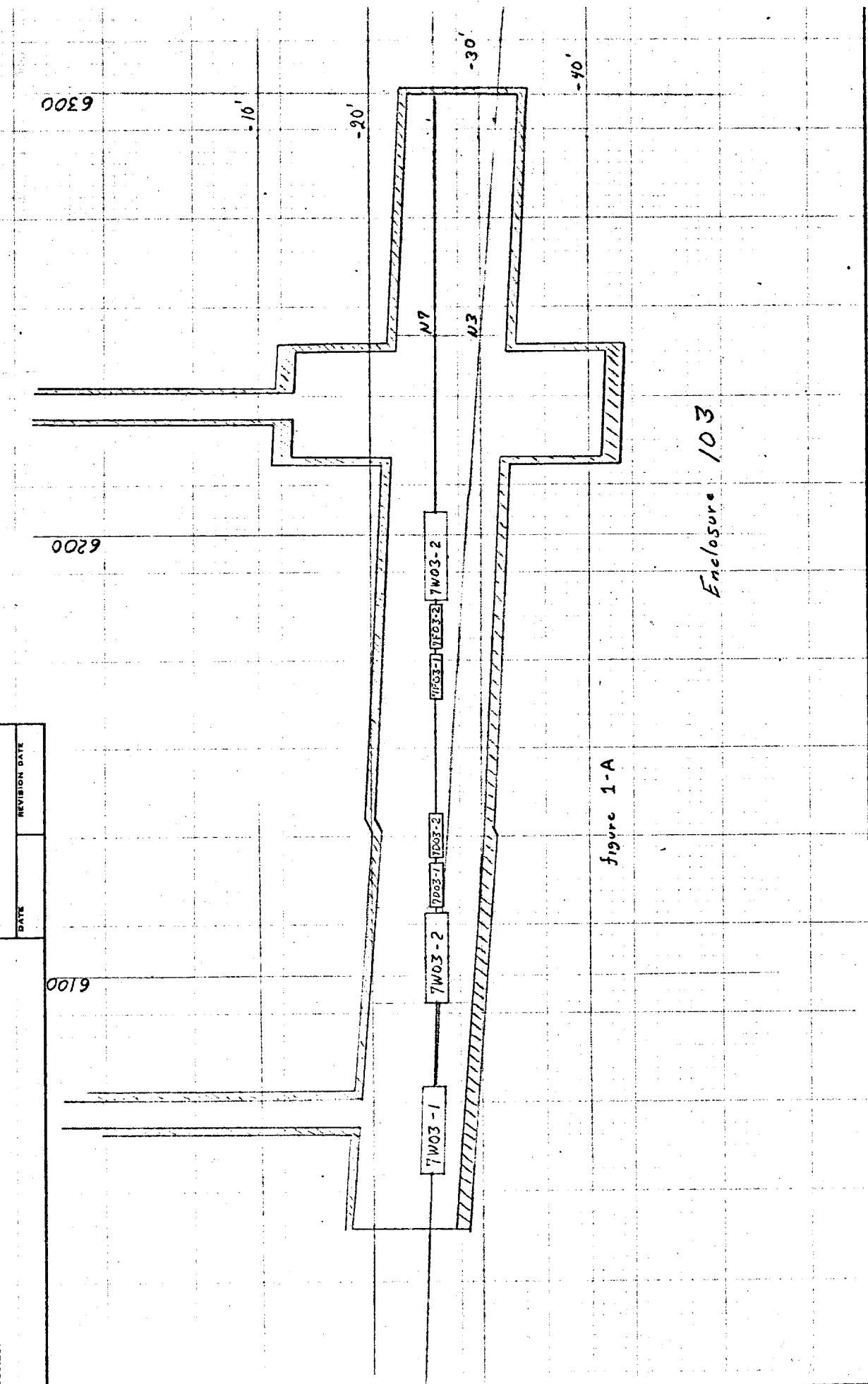
MAGNET TYPE	z (ft.)	x (ft.)	y (ft.)	B/G Kg/Kg/in	Name	ϕ rotation	x'	y'
3Q120	2227.4	-0.568	735.57	-4.4849	Q120-1		.11	10.084
3Q120	2238.4	-0.567	735.68	-4.4849	Q120-2		.11	10.084
3Q120	2269.4	-0.563	735.99	4.8812	Q121-1		.11	10.084
3Q120	2280.4	-0.562	736.10	4.8812	Q121-2		.11	10.084
5-1.5-120	2291.4	-0.561	736.22	9.645	VG2-1	-64.93°	.11	10.084
5-1.5-120	2302.4	-0.562	736.33	9.645	VG2-2	-64.93°	-.264	10.882
5-1.5-120	2313.4	-0.567	736.46	13.745	HG2-1	25.07°	-.637	11.681
5-1.5-120	2324.4	-0.581	736.58	13.745	HG2-2	25.07°	-1.775	11.148
5-1.5-120	2335.4	-0.607	736.70	13.745	HG2-3	25.07°	-2.913	10.616
4-4-30	2346.4	-0.646	736.81	0.789	HTG2	180°	-4.05	10.084
4-4-30	2349.9	-0.660	736.85	1.0455	VTG2-1	90°	-4.032	10.084
4-4-30	2353.5	-0.675	736.88	1.0455	VTG2-2	90°	-4.032	10.06
4-2-240	2868	-2.749	742.05	15.336	7VG3	90°	-4.032	10.036
4-2-240	3241	-4.254	744.78	13.321	7BN	82.09°	-4.032	7.234
4-2-240	3262	-4.342	744.90	13.321	7BN	82.09°	-4.367	4.822
4-2-240	3283	-4.437	744.98	13.321	7BN	82.09°	-4.702	2.411
3Q120	3315	-4.595	745.	5.240	7FN		-5.037	0
3Q120	3395	-4.998	745.	-4.885	7DN		-5.037	0
4-2-240	4806.2	-12.11	745.	15.237	7E00-1		-5.037	0
4-2-240	4827.7	-12.25	745.	15.237	7E00-2		-7.821	0
4-2-240	6055	-25.24	745.	17.13	7W03-1	180°	-10.606	0
4-2-240	6093.5	-25.56	745.	17.13	7W03-2	180°	-7.476	0
3Q120	6115	-25.68	745.	-3.626	7D03-1		-4.346	0
3Q120	6126	-25.73	745.	-3.626	7D03-2		-4.346	0
3Q120	6162.5	-25.89	745.	3.406	7F03-1		-4.346	0
3Q120	6173.5	-25.94	745.	3.406	7F03-2		-4.346	0

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TABLE I

MAGNET TYPE	z (ft.)	x (ft.)	y (ft.)	B/G Kg/Kg/in	Name	ϕ rotation	x'	y'
4-2-240	6185	-25.99	745.	17.13	7W03-3	180°	-4.346	0
Super Dipoles	6500	-26.4	745.	37.1	7B05A-1	26.55°	-1.216	0
"	6523.5	-26.35	744.96	37.1	7B05A-2	26.55°	5.455	-3.33
"	6547	-26.13	744.84	37.1	7B05A-3	26.55°	12.127	-6.67
"	6573.5	-25.71	744.61	37.1	7B05B-1	-31.04°	18.80	-10
"	6597	-25.19	744.42	37.1	7B05B-2	-31.047	25.19	-6.154
"	6620.5	-24.52	744.33	37.1	7B05B-3	-31.047	31.58	-2.307
"	6644	-23.70	744.35	0-40	7W05		37.97	1.54
5-1.5-120	7080.1	-7.124	745.	16.85	7V09	90°	37.97	1.54
Super Dipoles	7092.1	-6.67	745.	0-40	7E09-1		37.97	0
"	7115.6	-5.78	745.	"	7E09-2		37.97	0
"	7139.1	-4.88	745.	"	7E09-3		37.97	0
"	7162.6	-3.99	745.	"	7E09-4		37.97	0
"	7186	-3.10	745.	"	7E09-5		37.97	0
"	7209.5	-2.21	745.	"	7E09-6		37.97	0
Dump	7250	-.67	745.	"				



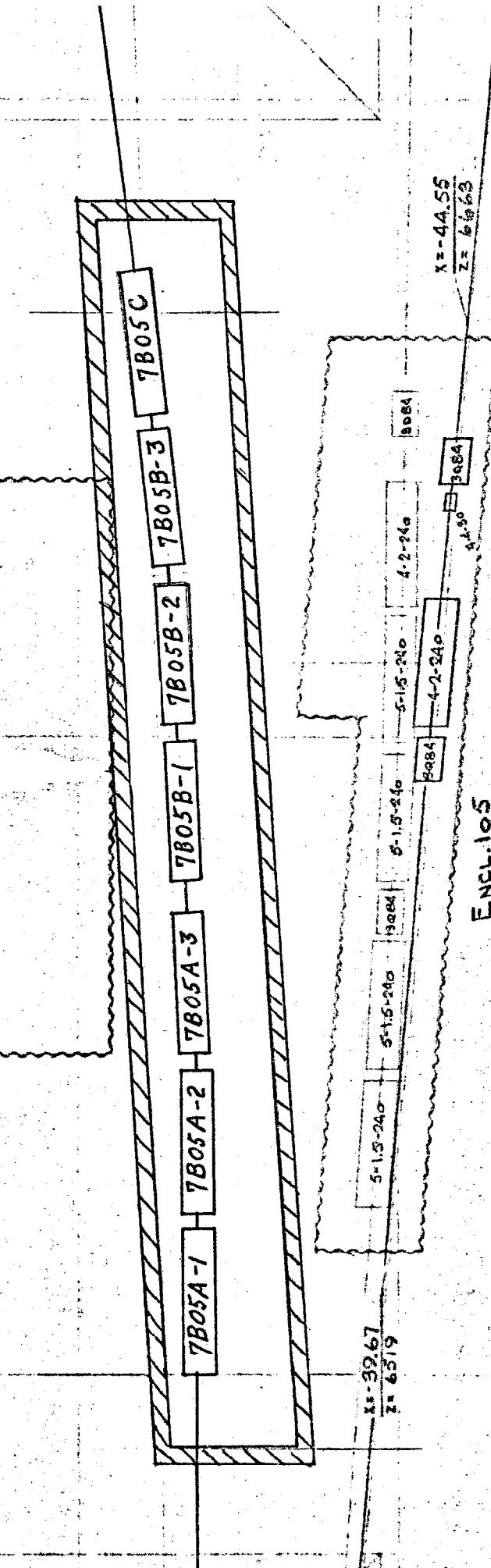
0029

0099

0059

figure
1-B

Wunder
Building



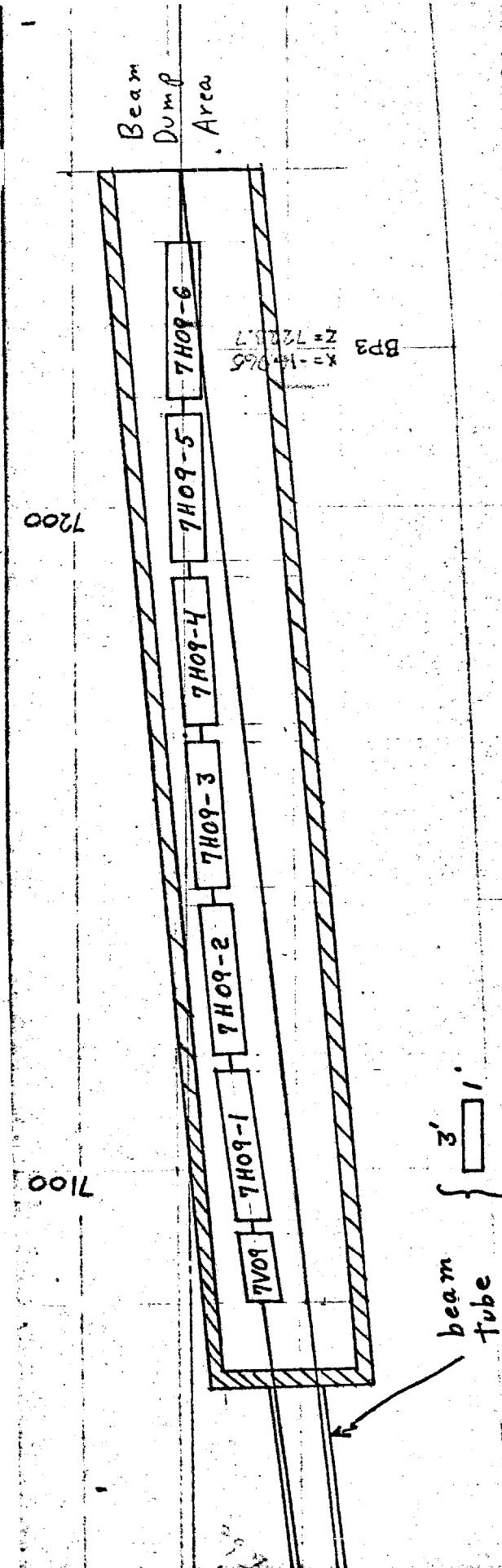
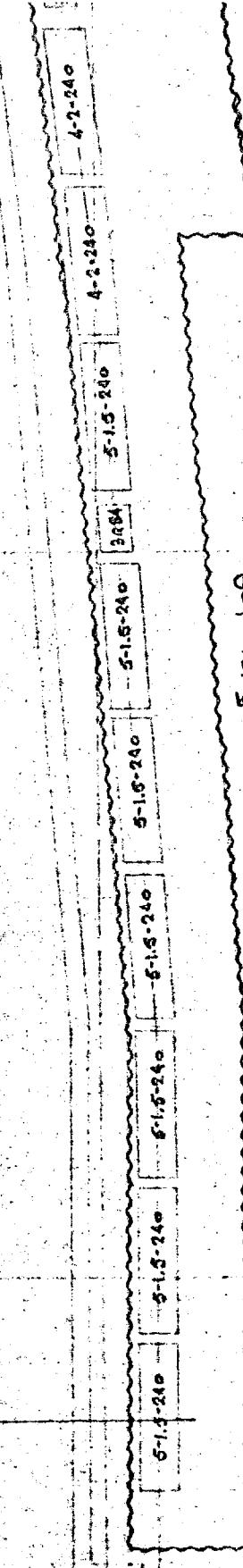


figure
1C



ENCL. 109

1=7148.694
1=60.986

